



United States  
Department of  
Agriculture

Animal and  
Plant Health  
Inspection  
Service

Veterinary  
Services

# Escherichia coli 0157:H7 Shedding by Feedlot Cattle

National Animal Health Monitoring System

Intense interest has focused on Escherichia coli 0157:H7 since the early 1993 outbreak of foodborne infection in several western states.

A number of governmental agencies and animal industry groups have expended a great deal of effort to collect more information about the pathogen and its ecology. The recently completed Cattle on Feed Evaluation (COFE) confirms findings from other studies which indicate that the organism occurs in animal populations at low frequency but is widely distributed.

In the fall of 1994, the USDA's National Animal Health Monitoring System (NAHMS) collected data on health and management of cattle on a broad-based sample of feedlot operations from the 13 major cattle feeding states (Figure 1). In addition, 100 volunteer feedlots were enlisted to provide samples to be tested for E. coli 0157:H7. The 100 feedlots were distributed across the 13 states roughly proportional to the number of cattle on feed in those states.

In each feedlot, the pen of cattle that had been on feed the shortest amount of time and the pen of cattle that had been on feed the longest amount of time were selected for feces collection. In addition, two other pens (if available) were selected at random for sampling. From each pen, 30 swab samples were collected from fresh feces on the pen floor and tested for E. coli 0157:H7.

Overall, E. coli 0157:H7 was recovered from 1.61 percent of the samples collected (Table 1). E. coli 0157:H7 was most commonly recovered from the pens of cattle that had been on feed the shortest period of time (3.01 percent of samples). Samples from pens of cattle that had been on feed the longest period of time were least likely to be positive for E. coli 0157:H7 (1.08 percent of samples). E. coli 0157:H7-positive

Table 1. Percent of samples positive for Escherichia coli 0157:H7.

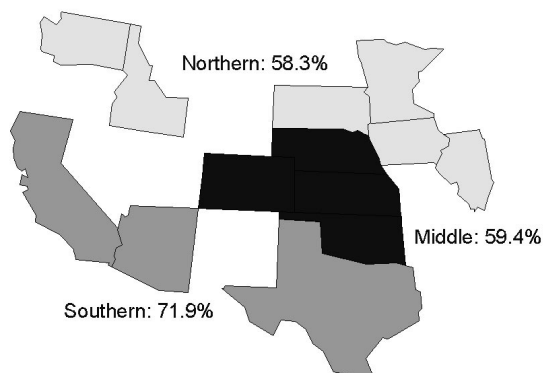
| Pen Type | Number Samples | Number Positive | Percent Positive | Percent of Positives |
|----------|----------------|-----------------|------------------|----------------------|
| Shortest | 2,988          | 90              | 3.01             | 47.1                 |
| Longest  | 2,963          | 32              | 1.08             | 16.8                 |
| Random   | 5,930          | <u>69</u>       | 1.16             | <u>36.1</u>          |
| Total    | 11,881         | 191             | 1.61             | 100.0                |

feedlots were widely distributed. Overall, the organism was detected in one or more samples from 63 percent of the feedlots. Feedlots from the more southern latitudes were more likely to be positive (71.9 percent) compared to the middle (59.4 percent) and northern (58.3 percent) latitudes (Figure 1).

All E. coli 0157:H7 isolates possessed the genetic material to code for the production of one or both of the toxins thought to be important in the pathogenesis of human disease (Shiga-like toxin 1 and Shiga-like toxin 2).<sup>1</sup>

Figure 1

## Percent of Feedlots Positive for Escherichia coli 0157:H7 in Participating States by Region



<sup>1</sup> Three isolates not available to be probed for the genetic coding for toxin production.

These data would seem to indicate that the E. coli O157:H7 organism is widely distributed in feedlot cattle populations, but the prevalence is very low. These findings are similar to other cattle populations that have been evaluated, such as dairy cattle and calves.

The percent of samples positive for E. coli O157:H7 in a pen varied from none to 36.7 percent. On a feedlot basis, the percent of total samples positive for E. coli O157:H7 varied from 0.0 to 10.0 percent. The variation in percent of samples positive per feedlot suggests that the agent may be amenable to reduction through management changes. The next phase of analysis of these data will focus on associations between management practices (general and nutritional) and number of positive samples. An increased or decreased likelihood of shedding of the organism has been tentatively associated with a variety of management factors in studies of dairy operations.<sup>1</sup> From these tentative associations, targeted studies will define factors which modulate shedding. Such studies may eventually lead to strategies for decreasing the shedding of the organism.

NAHMS collaborators on the COFE included the National Agricultural Statistics Service (USDA); State and Federal Veterinary Medical Officers; the National Veterinary Services Laboratories (USDA:APHIS:VS); and the Field Disease Investigation Unit, Washington State University.

Other information from the COFE is available on feedlot quality assurance measures, environmental monitoring, injection practices, and vaccination practices. For more information on these topics or the study in general contact:

**Centers for Epidemiology & Animal Health  
USDA:APHIS:VS, Attn. NAHMS  
555 South Howes, Suite 200  
Fort Collins, Colorado 80521  
(970) 490-7800  
Internet: [nahms\\_info@aphis.usda.gov](mailto:nahms_info@aphis.usda.gov)**

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<sup>1</sup> Reports discussing these findings are available from the address shown above.